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Understanding A Physician's Role in Combating the Anti-Vaccination Movement: A Retrospective Analysis Using 2014-2019 Data

Alisa C. Kim
Philadelphia College of Osteopathic Medicine

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Alisa C. Kim

ak256081@pcom.edu

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Abstract

Childhood vaccination has been one of public health's greatest achievements in its history. Just over the past 20 years, immunizations averted more than 21 million hospitalizations and 732,000 deaths in the US (Skinner, 2017). However, healthcare professionals, public health advocates, and researchers are still witnessing an unceasing tension between the anti-vaccination movement and pro-vaccination organizations. Since the invention of the first vaccines, individuals from various religious sects, cultural backgrounds, and ethnic groups have been questioning the efficacy of vaccines, the possible health risks and side effects that may be introduced, and the morality behind the act of vaccinating. With questionable rates of immunizations, some well-controlled and/or even eradicated diseases—measles in particular—have begun to resurface and affect millions across the nation. Ultimately, it is important for medical personnel, especially physicians, to raise awareness and properly educate their patients on vaccinations. Through a systematic analysis of the literature and scientific studies published from 2014 until the present day, this retrospective, qualitative study aims to determine why there is such an anti-vaccination rush and the factors causing it, investigate what physicians have been doing to combat the anti-vaccination sentiment, and offer a proposal that could be implemented to help providers improve health outcomes and better serve their patients by advocating for vaccination. In the final analysis, three key techniques that physicians should incorporate into their practice were examined: (1) study the ins and outs of childhood vaccinations and anti-vaccination responses, (2) execute practices of better communication about vaccines in order to build relationships based on trust, and (3) utilize personal social media platforms and reference parents to informational websites that accurately cover the pros and cons of vaccines.

Keywords: anti-vaccination, immunization, vaccine hesitancy, barriers, physician

Background/Introduction

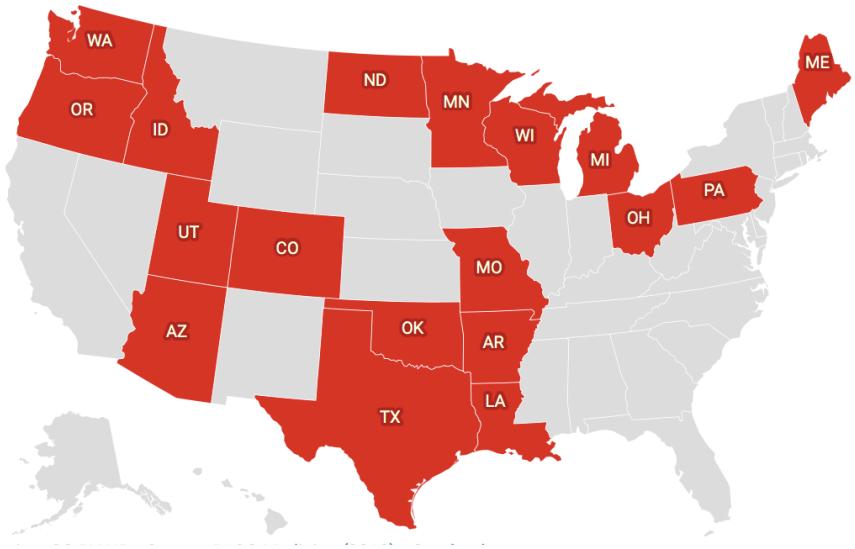
Since the 18th century, vaccinations have played an increasingly important role in suppressing diseases and illnesses that once increased mortality and morbidity rates, especially amongst the youth. Vaccinations have been revolutionary because of two primary factors: "First, once a person is immunized against a specific pathogen, the rate of that disease, as well as its associated asymptomatic carrier state, is decreased. Second, when a large population is immunized, unvaccinated individuals benefit from 'herd immunity,' which is a reduced risk of exposure to pathogens" (Ventola, 2016)[1]. Some diseases that were previously common in years prior have been eradicated due to immunization shots. Additionally, the WHO found that every year, vaccinations prevent between 2 to 3 million deaths around the world (Skinner, 2017). Even then, hesitancy or opposition to the administration of vaccines has not ceased; concerns of safety, strong attitudes toward a particular belief or idea, and/or a desire for more understandable information from healthcare providers are common reasons found among parents (McKee & Bohannon, 2016). These apprehensions have also led to a slight increase in the median percentage of reported exemptions among kindergartners in the US, from 1.9% during the 2015-2016 school year to 2.2% during the 2017-2018 school year (Mellerson et al., 2018). This 0.3% increase in noncompliance still has the potential to affect hundreds of other students who are immunocompromised or undervaccinated. Though vaccination coverage remains relatively high and herd immunity is maintained (e.g., 94.3% for 2 doses of the MMR vaccine; herd immunity threshold for measles = 93-95%), coverage could always be improved upon not only in the States but in other countries as well in order to maximize protection (Oxford Vaccine Group, 2018).

Recently, diseases like the measles—which have been eradicated from the United States in the year 2000—are starting to rebound in multiple areas around the world, including New

York, Washington State, Oregon, France, and Italy (Zara, 2019). In the first five months of 2019 alone, the CDC reported that about 65% of those who contracted measles in the US were unvaccinated (Keating, Mayes, & Meko, 2019)[2]. This statistic could be backed up by a study conducted at the Stanford University School of Medicine and Baylor College of Medicine, which found that even a "5 percent drop in the number of children ages 2 to 11 inoculated against the measles, mumps, and rubella would triple the number of annual measles cases in this age group" Digitale, 2017). This scenario estimates the effect of declining vaccination rates for the mumps, measles, and rubella vaccine (MMR) alone and does not take into consideration the impact of lower vaccination coverage of other infectious diseases, like mumps and pertussis. Accordingly, it is no surprise that the world is witnessing outbreaks of vaccine-preventable diseases; there has been a recent surge in the anti-vaccination movement, in both the United States and parts of Europe, which has been a long-standing phenomenon that has been growing and jeopardizing the health of society. These outbreaks are illustrations of what could ensue if people do not take vaccine-preventable diseases seriously. As noted above, herd immunity, or the coverage threshold that halts illnesses in their tracks so an epidemic does not occur, could be attained if enough children are inoculated (Lopez, 2016). Unfortunately, compliance to uptake will always vary because conflicts between the "rights of parents to raise children as they see fit" and the "duty of the government and society to protect the welfare of children" have not been uniformly settled (Arora, Morris, & Jacobs, 2018). With the line between vaccination regulations and implementation being unclear, it has been and will be very difficult to strictly enforce one normalized, operational protocol in today's society. Nonetheless, over the past two decades, vaccine advocates have been exploring the reasons for the rebounds in disease incidence and prevalence. Both the Centers for Disease Control (CDC) and Prevention Advisory Committee,

along with public health proponents, have been attempting to issue standard, annual recommendations and guidelines for childhood immunizations. Despite having apparent goals and directions available for the public to see, researchers like Ventola (2016) are observing that some parents choose to follow alternative immunization schedules or decline vaccinations altogether due to medical, philosophical, religious, personal, and/or socioeconomic reasons[3], or even because of misinformation or not having enough knowledge about vaccines. In the United States, all states allow medical exemptions, but 18 states also allow nonmedical vaccine exemptions, as of November 2018 (Hotez, 2018). Figure 1 displays these 18 states on the map below:

Figure 1. Map of states that allow nonmedical vaccine exemptions.



Of these 18 states, 16 of them allow religious exemptions (minus Minnesota and Louisiana). Moreover, "12 of the 18 states permitting these religious and philosophical-belief nonmedical exemptions (NMEs) demonstrated as overall upward trend of enrolling kindergarteners with NMEs since 2009: AR, AZ, ID, ME, MN, MO, ND, OH, OK, OR, TX, and UT" (Olive, Hotez, Damania, & Nolan, 2018)[4]. Their findings also indicated that high numbers of NMEs were

concentrated in densely populated urban centers. This is especially problematic as "outbreaks of vaccine-preventable diseases could either originate from or spread rapidly throughout these populations of unimmunized, unprotected children" (Olive, Hotez, Damania, & Nolan, 2018). Table 1 demonstrates many of the large cities with busy international airports that often have many NMEs.

Table 1. Ranking of the leading metropolitan areas with >400 total kindergarten NMEs.

Rank	County	State	Largest City by Population	NME Total, 2016–2017
1	Maricopa	Arizona	Phoenix	2,947
2	Salt Lake	Utah	Salt Lake City	956
3	King	Washington	Seattle	940
4	Multnomah	Oregon	Portland	711
5	Oakland	Michigan	Troy	686
6	Utah	Utah	Provo	662
7	Harris	Texas*	Houston	592
8	Tarrant	Texas*	Fort Worth	518
9	Collin	Texas*	Plano	478
10	Macomb	Michigan	Warren	477
11	Wayne	Michigan	Detroit	466
12	Allegheny	Pennsylvania*	Pittsburgh	424
13	Travis	Texas*	Austin	413
14	Jackson	Missouri	Kansas City	412
15	Spokane	Washington	Spokane	405

Evidently, receiving exemptions to vaccine mandates due to religious reasons has been an area of complication that accounts for the majority of all vaccine refusals without compromise. Religious exemptions pose a "major obstacle to those seeking to increase childhood vaccination rates" because reasons rooted in someone's faith are "generally linked to the core beliefs of the parents, and it is very difficult to dissuade these individuals from views against immunization. These choices are not the by-product of ignorance but rather the intentional and calculated decision related to a staunch conviction" (McKee & Bohannon, 2016). Research has been done in the recent past to provide discussion regarding specific religions and each of their acceptability of vaccines. Wombell, Fangman, Yoder, and Spero (2014) evaluated seven different religions and the details behind how vaccination is a violation to their religious tenets: Judaism, Hinduism, Roman Catholicism, Protestantism, Amish, Islam, and Jehovah's Witnesses.

In summary, the explanation that was most common dealt with the belief in the sanctity of life and the components of the vaccines, especially those in *rubella*: "Objections base upon religion most often center on the use of aborted human fetus tissue used in the *rubella* component of the combined vaccine products, and animal-derived gelatins used in vaccine production." Other justifications revolved around apprehensions related to vaccine safety and efficacy, poor access to health care, a resilient trust in God for good health, and lack of circumstances actually necessitating vaccines. Subsequently, with more opportunities to not only properly educate these religious groups in vaccines but also do more pharmaceutical research to take into account the concerns these people have, the world could potentially render immunizations more acceptable for many religions.

Misinformation is another problem that has come into friction with vaccine recommendations. One of the biggest controversies that originated from misinformation has been the hypothesized link between the MMR vaccine and autism established by Andrew Wakfield in 1998, which continues to stir much controversy and concern today (Rao & Andrade, 2011). Unfortunately, this misnomer has greatly challenged vaccine acceptance, even after many studies have resolved the fact that there is no link between the MMR vaccination and the risk for autism. In order to put this debate to rest for good, Hviid, Hansen, Frisch, and Melbye (2019) designed a nationwide cohort study that utilized Danish population registries to compare information on "MMR vaccine, autism diagnoses, other childhood vaccines, sibling history of autism, and autism risk factors to children in the cohort" of 657,461 children born in Denmark between 1999 and 2010. Ultimately, the study evaluated whether or not the measles, mumps, rubella vaccine "increases the risk for autism in children, subgroups of children, or time periods after vaccination." As expected, the study strongly supported that "MMR vaccination does not

increase the risk for autism, does not trigger autism in susceptible children, and is not associated with clustering of autism cases after vaccination" (Hviid, Hansen, Frisch, & Melbye, 2019). The concrete data and results from this research study hopefully offer reassurance to parents who evade or deny childhood vaccinations due to prior perceptions regarding the MMR vaccine and its link to autism. Accordingly, misconceptions that instigate vaccine hesitancy, such as those surrounding the MMR vaccine and autism, must be appropriately addressed in order to educate parents with factual evidence.

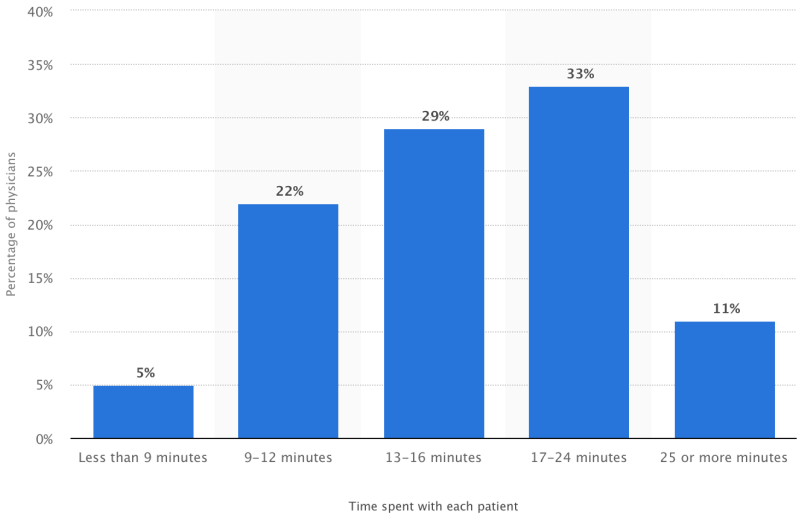
The World Health Organization (WHO) has made a summarized version of six misconceptions that exist about being vaccinated, taken from the CDC. According to the WHO (2013), such misconceptions included statements like, "Diseases had already begun to disappear before vaccines were introduced, because of better hygiene and sanitation," "Vaccines cause many harmful side effects, illnesses, and even death—not to mention possible long-term effects we don't even know about," and "Vaccine-preventable diseases have been virtually eliminated from my country, so there is no need for my child to be vaccinated." With the ongoing advancements being made in modern society, people will observe better technology, medicine, sanitation, cleanliness, and general health overall going into the future, and these advancements will certainly have their place in disease prevention and control. However, just because a vaccine-preventable disease may be well-controlled or completely eradicated, it does not mean the chance of the bug resurfacing is impossible. In one instance in Japan, the CDC (2017) reported the following: In 1974, 393 cases of pertussis, also known as whopping cough, were recorded. Immunization rates then took a plunge from 80% to 10%, causing the number of cases to rise, resulting in over 13,000 cases and 41 deaths in 1979. It is notable, however, that as immunization increased again, the number of cases exhibited an inverse relationship—it started

to drastically decrease. Similar cases have also been seen in European countries and the United States as well, and they demonstrate the point that this is not an isolated event. While there may only be a small number of cases reported in a country at any given moment in time, without the proper prevention measures, reported cases could escalate quickly and significantly, as seen in Japan. Even in the States, it was suggested that "continued challenges to school vaccination requirements are expected with the increasing numbers of vaccines being introduced and the generally low level of visible threat from disease" (Malone & Hinman, 2007). The outcome of not vaccinating could be catastrophic, since disease can spread from one country to another via travel and visitors.

Though vaccination protocols may be common-ground in the United States and elsewhere, the appeal of the anti-vaccination sentiment has been heightening for reasons that could be dealt with at the community level. Countries like France found that certain discrepancies were present concerning general practitioners and their vaccine recommendations to patients: "The most frequent type of discrepancy, by far, concerned GPs who reported that their children were vaccinated, but did not systematically recommend the same vaccines to their patients." Barriers were distinguished to account for such an observation, which included "difficulties in convincing some vaccine-hesitant patients to be immunized, forgetting to recommend the vaccine to adolescents… lack of time during the consultation, [and] organizational issues [like] difficulties in accessing the vaccination record" (Agrinier, Le Marechal, Fressard, Verger, & Pulcini, 2017). Similar types of barriers cannot be ignored in the States. With many patients to see in a day, doctors might be in a deadlock because there may not be time to talk about vaccines in their practice. Although the time a doctor spends with his or her

patients can vary by specialty, an updated 2018 survey reported the average time to be 13-24 minutes in the United States (Statista, 2018). The results are shown in Figure 2.

Figure 2. Graph displaying average time physicians have with patients.



General practitioners are regularly constrained in their time actively working with their patients. As seen with increasing vaccine exemptions, patient care outcomes could be impacted as a direct effect of physicians not employing enough information or awareness.

Apart from these barriers, there is no doubt that physicians serve as influential moderators who could push parents towards one end or the other. According to Mergler et al. (2013), the vaccine beliefs of health care providers are similar to those of the parents, and immunization beliefs are highly associated between them. Provider beliefs may contribute to parental decisions to accept, delay, or deny vaccinations. Parents may selectively choose providers who have similar beliefs to their own. Furthermore, it has been suggested that health care provider-based interventions—such as patient counseling, offering combination vaccines, and maximizing patient office visits—overcome noncompliance when it comes to vaccinations (Ventola, 2016). Hence, further research on past scientific studies has to be conducted in order to organize and understand any and all discrepancies lurking amongst conversations between

doctors and their patients. By doing so, the inquiring of two questions can be examined to explore the reasons underlying vaccine hesitancy**,** behaviour, and/or denial: (1) What are general practitioners doing to suppress the rising sentiment? And (2) What actions can be executed to help providers better serve their patients by encouraging them to immunize their children?

Accordingly, with the reviewing of motivating forces that have been fostering the anti-vaccination movement and the consequences that are stemming from it completed, this paper will evaluate the initiatives general health practitioners have been taking and/or should take in order to solve this global crisis. How vaccines are discussed between patients and their families may influence initial perceptions of the vaccines, which may have future indications for acceptance. The analysis will allow society to better understand the extent to which vaccinations is being handled by general practitioners and the implications for disseminating accurate health information regarding vaccines and their effectiveness while encouraging patients to receive them at the same time. As stated in the article *Ethical Issues and Vaccines* (CDC, 2018), "tension results when individuals want to exercise their right to protect themselves and/or their children by refusing vaccination, if they do not accept existing medical or safety evidence, or if their ideological beliefs do not support vaccination." If the medical community, especially physicians, can work collectively to promote the advantages of vaccines while tackling the ethical concerns at the same time, then hopefully they could embark on efforts to decrease the tension individuals feel about immunizing their children moving forward.

METHODS

Design/Procedure:

Databases such as Embase, Pubmed, MEDLINE, Scopus, and Google Scholar, along with news articles and journals from Google searches were utilized to search and analyze already

existing data in articles that are pertinent to the discussion of the growing anti-vaccination movement throughout different parts of the world and physicians' efforts in suppressing the sentiment. A list of three keyword combinations was used to run the search across the databases. Any overlapping articles among the search terms were excluded in the count under "Records Used" of the latter two combinations. Below is the number of articles retrieved and used from the search (Table 2):

Table 2. Term combinations used in search strategy.

Search Terms / Keywords	**Database**	**Number of Articles**	**Records Used** (duplicates accounted for)
Vaccination AND Physician	Embase	360	10
	Pubmed	446	21
	MEDLINE (Ovid)	23	1
	Scopus	1,580+	--
Anti-vaccination movement AND Physician	Embase	2	1
	Pubmed	2	0
	MEDLINE (Ovid)	0	0
	Scopus	15	4
Vaccine hesitancy AND Physician	Embase	14	3
	Pubmed	14	1
	MEDLINE (Ovid)	2	0
	Scopus	61	7

Articles were screened by title, abstract, and keywords, depending on an inclusion and exclusion criteria. The included pieces focused on the following: (1) the physician's role(s) in childhood vaccination processes, (2) how physicians address vaccine hesitancy and/or denial in clinical practice, and (3) tactics that are recommended by the CDC, researchers, and other healthcare professionals or personnel that physicians should utilize in their own practice in order to deter any anti-vaccination opinions. Articles were omitted if they were not exclusively about physicians, were not in English, were published papers from countries outside of the United

States and Europe, were about adult vaccine delivery, or were about specific vaccines other than the MMR vaccine (if applicable). Furthermore, a retrospective analytical approach was taken, where articles published only between January 2014 and April 2019 were compared to unravel the venues that have to be improved upon for more successful vaccination rates. Actions that physicians have already been taking, or the lack thereof, were also evaluated to stress the vital role physicians play in motivating people to get vaccinated. The form of analysis was qualitative, since the data collected were gathered from scientific papers and journals that were descriptive in nature.

Results

Out of the 900+ search results that came up using the three term combinations that are indicated above, only 48 articles were pertinent to the research question at hand. Duplicates and papers that fell outside of the inclusion criteria were disregarded. Literature review of the existing data of these 48 papers, along with journal and news articles through Google, revealed three reoccurring, overarching improvement strategies to help physicians optimize vaccination delivery: (1) closely studying different scenarios of hesitancy, refusal, and exemptions to boost provider vaccine confidence, (2) incorporating better communication practices that build rapport and trust when talking about vaccines, and (3) utilizing social media and the Internet to circulate evidence-based information regarding vaccines in order to suppress the impact of anti-vaccination groups online. These three ideas were common across more than 50% of the papers in one way or another.

Discussion

The current study examined actions that have been taken or should be taken by physicians to combat the anti-vaccination movement, suppress the possibility of diseases from

resurfacing, and promote the effectiveness of vaccines. Many countries around the world, especially the United States and Europe, have been witnessing a strengthening in the anti-vaccination sentiment over the past couple of years. After analyzing the underlying reasons and issues that have been moving the anti-vaccination movement forward in the 21st century, we determined that physicians could play an impactful role in combatting parents' decision to deny or stall vaccinations for their child(ren). As such, several gaps are present in many people's knowledge of vaccines that are leading to negative presumptions about them. Fortunately, physicians could be key contributors to the dissemination of correct information regarding vaccines and their benefits that greatly outweigh the risks. However, surprisingly, studies have found that a good handful of physicians in both the United States and parts of Europe are ill-equipped to talk about the importance of vaccinations to their patients and answer questions that they might pose. According to McKee and Bohannon (2016), a large number of parents admits to having apprehensions about childhood vaccinations and would like to consult their doctors about their concerns and subsequent hesitancy. Accordingly, the present findings indicate that physicians need to be prepared to educate these potential anti-vaxxers. In order to be ready, physicians could incorporate the three proposed methods laid out in the succeeding paragraphs that have been observed to be effective.

Firstly, physicians need to be well-educated in the subject area of vaccine-preventable diseases and vaccinations to be able to confidently address parental concerns and questions. Educational and verifiable material should always supplement doctor-patient conversations so that the tangible evidence makes it almost impossible for patients to respond defiantly (Danchin & Nolan, 2014). In a cross-sectional survey piloted in France, results showed that about 33% of graduating medical school students felt inadequately prepared to handle vaccination-related

apprehensions. Therefore, practical training that involved hands-on methods was put into action at the early stages of the medical career, after which revealed a significant association between these case-based, clinical learning and higher perceived preparedness when delivering vaccine information to patients (Kernéis et al., 2017). This case depicts the importance of improving vaccine education for both medical students and physicians to increase vaccination coverage around the world. Another study done in France looked at vaccination errors in general practice, where they discovered a number of avoidable errors occurring, such as routine or knowledge-related errors "due to lapses in execution or concentration" and "failures to apply standard rules for the procedure due to errors in mental representation" (Charles, Vallée, Tissot, Lucht, & Botelho-Nevers, 2016). Hence, they concocted a vaccination checklist[6] for physicians to aid in the vaccination process, and it was proven to be useful and usable. A standardized curriculum or training resource like the preventative checklist should be organized on a national scale as well to increase knowledge and better prepare future and current physicians for situations involving vaccine-hesitant or anti-vaccine patients. In several other study populations in Europe, physicians were determined to be the most-trusted individuals for healthcare-related information, which "underline[d] the necessity of comprehensive informational campaigns on the merits of vaccination" (Sandhofer, Robak, Frank, & Kulnig, 2017). Optimizing the frequency of vaccine discussions is only one aspect of the equation; being able to successfully transmit valuable information at the level of the patient completes that equation. Developing new approaches to vaccine consultation could definitely help physicians replace any falsifications with evidence-based facts and thus combat the rising anti-vaccination movement and the hesitancy that results from it. These approaches present a caveat though: in reality, a pragmatically brief training intervention will not show the slightest impact on apprehensive patients (Henrikson et al., 2015).

With the extensive educational career that physicians are already committed to, the probability of them having additional time for prolonged training is low. Because vaccines are only effective if parents are willing to take them up, physicians need to consider practical ways to obtain a solid vaccine education. An inadequate discussion that is short in length and lacking in depth, dismissive, and difficult will not encourage parents to vaccinate their children.

Secondly, physicians should research ways to effectively approach vaccine hesitant patients and work on improving their vaccine communication skills. Becoming better-educated requires more than researching the vaccine-preventable diseases to their core. As discussed earlier, people's judgments of vaccination are impaired caused by various barriers. Due to these differences in barriers, it is imperative that physicians know their patients and how to confront them based on their cultural background and beliefs. For instance, a physician should not speak to a patient who practices Hinduism the same way as he would to a patient who is a Jehovah's Witness. When promoting the MMR vaccine, the doctor should be aware of the fact that the Hindu faith does not "explicitly prohibit the use of vaccines, but followers of the faith may object to vaccination due to its derivation from fetal cells or containing bovine components," whereas the Jehovah's Witness faith originally considered vaccines as "blood products and were not to be administered" (Wombell, Fangman, Yoder, & Spero, 2014). Every single physician will inevitably have a diverse patient population that they care for. When encountering religious objections to any vaccine-preventable diseases, doctors need to be able to address them without offending anyone in the room. As principal interlocutors, physicians also need to develop a communication style that is not only based on cultural knowledge but also trust, empathy, competency, dedication, and science. According to Tafuri et al. (2014), counseling through active listening is the "most used mean to create an exchange and communication: patients need

to communicate and communication takes place within a specific relationship, the therapeutic alliance." In Switzerland, researchers have shown that "adding a personal touch to the discussion, or adapting the principles of motivational interviewing to immunization will help physician guiding the parent towards an informed choice, favorable to the child's vaccination" (Manasseh-Zumbrunnen, Breton, & Blanchard-Rohner, 2017). Patients want to be heard while they look for reliable information. Being personable and sharing storylines allow physicians to meet patients where they are at and show that they care about them. The CDC (2018) has also laid out provider resources for vaccine conversations with patients, which stresses giving their strong recommendation as physicians while being mindful of the patient's voice in vaccination and vaccine safety. Ultimately, effective communication requires physicians to realize that each patient encounter takes its own shape, so proper instruction on how to corroborate and compassionately reinforce the social norm to vaccinate is compulsory in order to suppress the anti-vaccination sentiment.

Lastly, physicians should utilize the Internet and social media platforms to fight the ongoing anti-vaccination sentiment online. In today's modern society, technology and the use of electronics have taken over. Answers to questions and unfamiliar subjects are found on the Internet. However, it does not only contain accurate information and is unfortunately the safe haven of many controversies, conspiracies, misinformation, propagandas, and antagonistic groups. In a study conducted by Tafuri et al. (2014), 15.4% of websites were classified as sites run by an anti-vaccination group or individual alone. With the advancements in technology, that percentage is understood to have increased over the past couple of years. Physicians must realize this and use what is immediately available to them to their advantage. As backed up by Philip, Shapiro, Paterson, Glismann, & Van Damme (2016), "converting the results of vaccine research

into a successful vaccination program and replacing misinformation with evidence-based communication will require a multidisciplinary approach that embraces modern digital and tailored applications to reach out to all populations." Utilizing a global computer network should be strongly considered because the anti-vaccination movement already uses social media, including Facebook and Twitter, as a fertile ground for sharing and spreading their anti-vaccine messages. These messages even include the use of naturopathic medicine, homeopathy, and maintaining a healthy diet as a means of not having to vaccinate (Moran, Lucas, Everhart, Morgan, & Prickett, 2016). Understandably, the Internet is a public domain that connects many people around the world, and so the public's reliance on social media will only increase as time goes on. In France, anti-vaccine campaigners have been going viral; however, this problem is not only seen in France (Young, 2019). There is hope, though; physicians can "correct misinformation by establishing its own social media communities and leveraging established channels to provide facts about the safety and value of vaccines" (Infectious Disease Advisor, 2019), especially in an era when "more than 2.3 billion people in 232 countries are active on social media" (Gu et al., 2018). If the reinforcing of negative vaccine attitudes continues without being tamed by trusted sources of information, vaccine noncompliance and collective distrust will only worsen. For that reason, investing time into web communication as a vehicle to constrain the prolific space the media offers for anti-vaccination groups to spread their distorted beliefs and to gain followers will become one of many duties physicians have to fulfill.

At the end of the day, these three strategies could be implemented into vaccine policies on how we as a country can better serve our patients and their children. With the past research projects that have been completed in both the United States and European countries to suggest

ways physicians could make a lasting impact on their patients in the realm of vaccines, physicians should have a better idea of how the anti-vaccination movement can be controlled. Incorporating these strategies into everyday practice could definitely tap into patients' values and help with vaccine promotion communication.

This study presents itself with limitations. This study only looked at physicians' roles in combatting the anti-vaccination sentiment in a more general sense. Analyzing what other healthcare professionals, like nurses and physician assistants, have been doing could offer a more complete outlook on what needs to be done to combat the anti-vaccination sentiment. Additionally, findings were based on a small pool of resources and articles, for many papers were omitted based on the exclusion criteria due to limited time for the project. It would be ideal to obtain and translate papers that were published in different languages as well, for they could give better insight into the anti-vaccination movement from their point of view.

Conclusion/Future Design

Through a thorough analysis of past research studies and articles, this project demonstrated how studying the details and patterns of the anti-vaccination movement can bring forth ideas on how people—physicians in particular—could help calm the sentiment while increasing the vaccination rate. Physicians have a professional obligation to favor the interest of the patient and thus properly counsel them in child vaccinations. Unfortunately, almost all physicians will encounter patients who refuse child vaccinations. Even though disease rates have been relatively low in the States after vaccines were introduced, recently, the country has been observing a turn of events for the worse. Outbreaks have been re-emerging; people have been letting themselves become vulnerable by not vaccinating for various reasons. Though the reasons behind vaccine hesitancy and refusal are complex in nature, physicians could be the trusted

sources of information that parents could openly go to with their concerns and questions. In the process of educating the patient, Devitt (2018) advises physicians to "keep it as simple and objective as possible, remain respectful. Give your patients time to think over multiple visits and conversations." Vaccine education and communication could serve as cornerstones to fight the widespread fears over the safety and effectiveness of vaccines that are seen on the Internet as well. There is no doubt that vaccination has been one of the most successful public health interventions to prevent avoidable cases of mortality and morbidity. Physician recommendations regarding vaccination are important for acceptance, which will help equip patients with the truth and reduce the growing public disaffection with vaccinations in the long run.

In future studies, a more comprehensive approach should be implemented in order to get a greater idea of what other healthcare personnel from countries with high vaccination rates have been doing to encourage patients to get vaccinated. It will also be important to look at other vaccines besides MMR, such as the HPV and influenza vaccines, and their success rates in vaccination around the globe. Furthermore, future studies should aim to analyze the efficacy of the specific types of counseling interventions suggested in this project in order to see if they are in fact legitimate strategies for physicians to practice as a way to combat the anti-vaccination movement.

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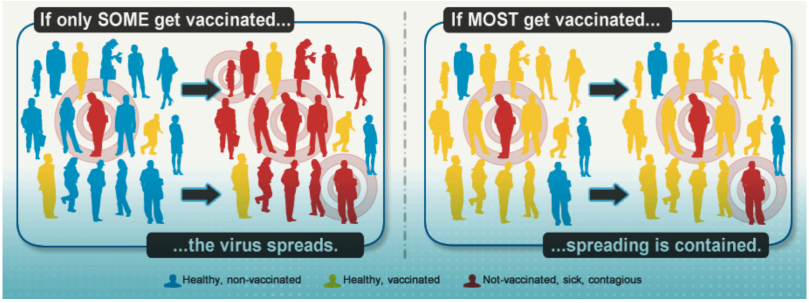
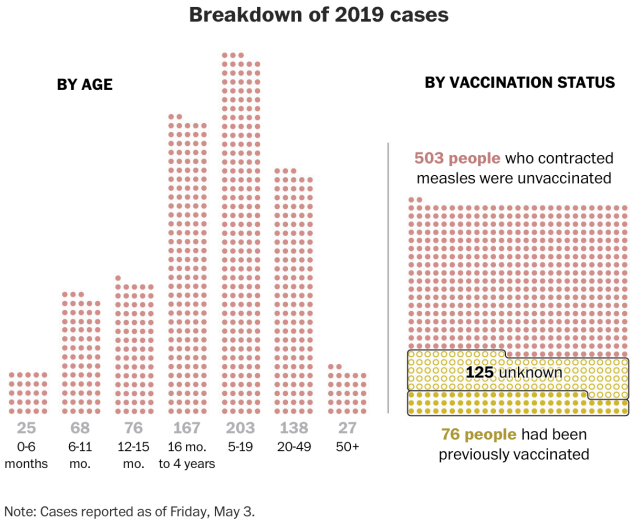
Appendix

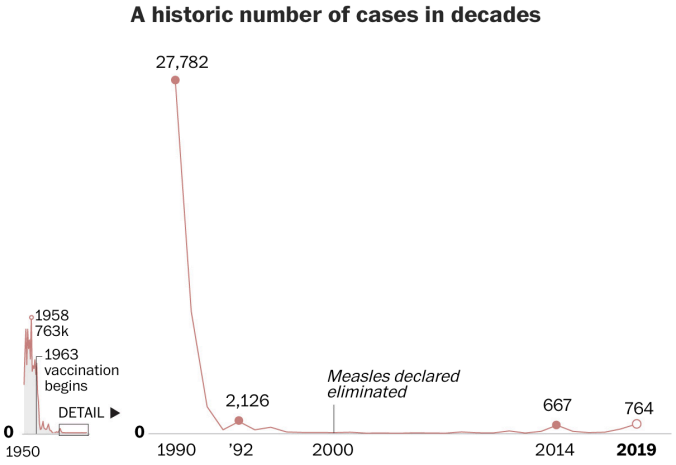
1. Herd Immunity. *National Center for Immunization and Respiratory Diseases. (2018, June).*



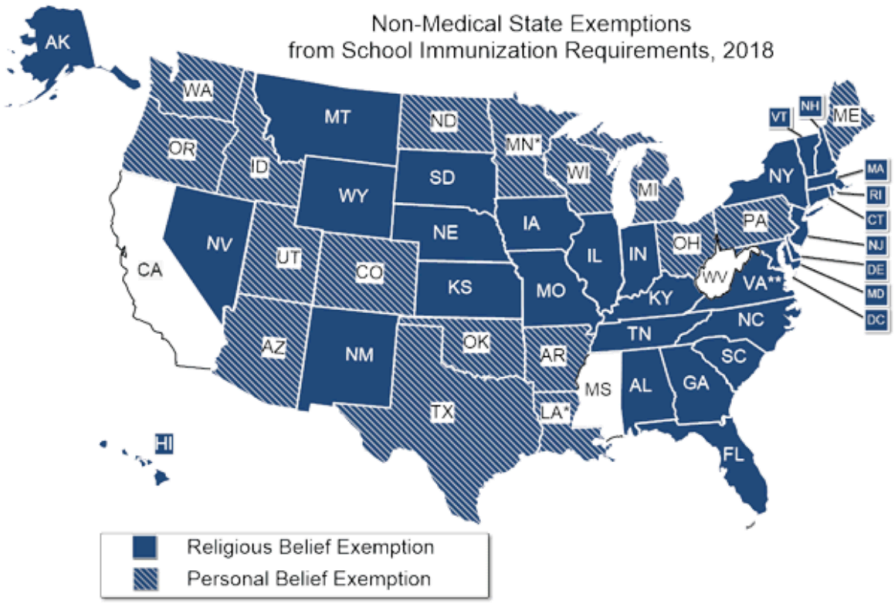
2a. 2019 Measles cases. *Keating, Mayes, & Meko, 2019*



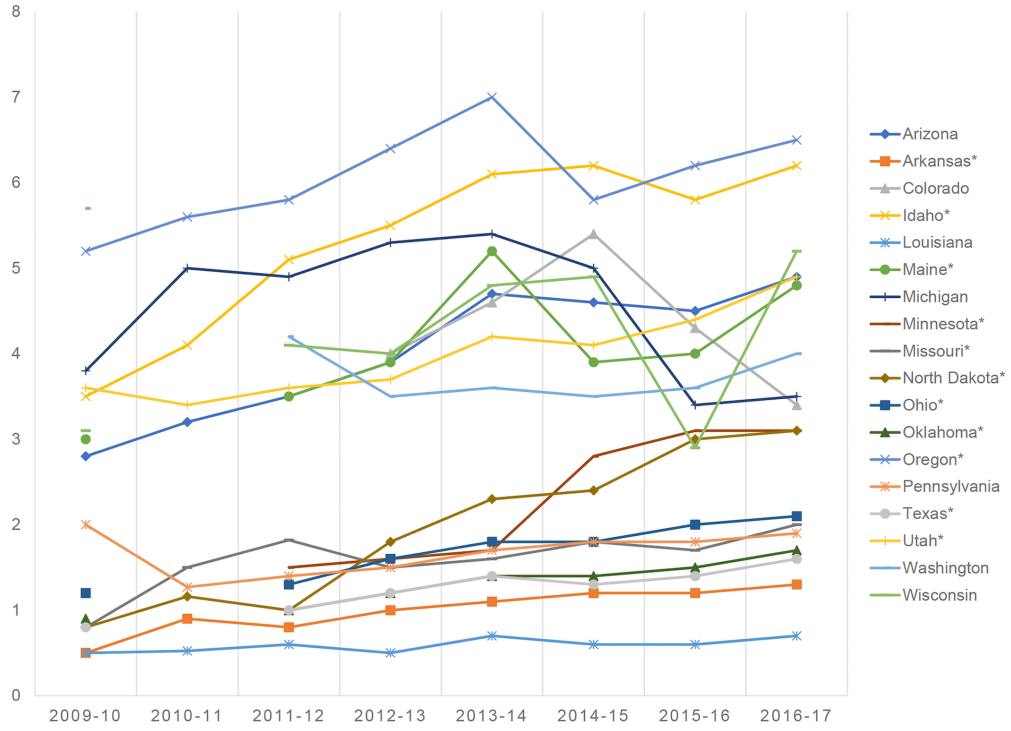
2b. History of measles cases. *Keating, Mayes, & Meko, 2019*



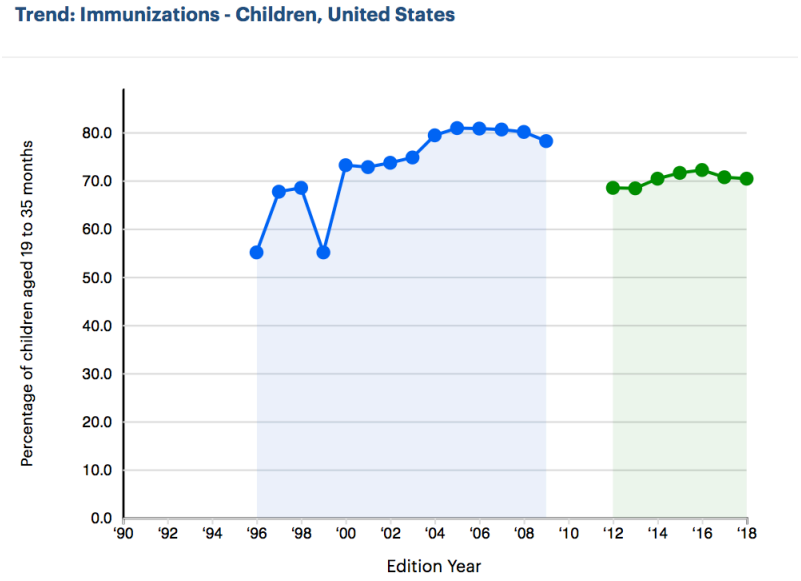
3. Nonmedical Exemptions by state. *Adapted from the LexisNexis StateNet Database and the Immunization Action Coalition. (2018, February).*



4. *Olive, Hotez, Damania, & Nolan, 2018.*



5. Percentage of children aged 19 to 35 months who received recommended doses of diphtheria, tetanus, and acellular pertussis (DTaP), polio, MMR, Hib, hepatitis B, varicella, and pneumococcal conjugate vaccines. 2018 US Value: 70.4%. *(CDC, 2018)*.



6. Vaccination checklist. *Charles, R., Vallée, J., Tissot, C., Lucht, F., & Botelho-Nevers, E. (2016, May)*.

Before administration of the vaccine	During preparation and administration of the vaccine	After the vaccination
Vaccination status documented? Vaccination card Health record Medical records Yes ☐ No ☐	Am I focused, calm atmosphere, telephone turned off? Yes ☐ No ☐	Disposal of needles in special container? Yes ☐ No ☐
Is it the right vaccination date? Yes ☐ No ☐	Equipment within reach? (epinephrine, compress, antiseptic, dressings, container for medical waste) Yes ☐ No ☐	Is the patient seated or lying down for 15 minutes after the procedure? Yes ☐ No ☐
Vaccine quality: Not out of date? Storage conditions? Yes ☐ No ☐	Preparation of vaccine syringe: Reconstitution Needle placement Flushing Yes ☐ No ☐	Traceability ensured? Vaccination noted on health record and medical records Next vaccination noted? Yes ☐ No ☐
Absence of contraindications? (undocumented neurological disorder, immunodepression, allergy, fever) Yes ☐ No ☐	Site and route (IM/SC) of injection properly identified? Yes ☐ No ☐	Informing the patient: Anticipated adverse effects? Recall date, if any? Yes ☐ No ☐
Packaging checked in front of the patient: Right vaccine? Right dose? Yes ☐ No ☐	Patient (and family) relaxed: seated or lying down? Yes ☐ No ☐	Notification of an adverse event if applicable? Yes ☐ No ☐